

MPI TS300-SE |

300 mm Manual Probe System with ShieldEnvironment™

For accurate and reliable DC/CV, RF and mmW measurements

FEATURES / BENEFITS

Universal Use

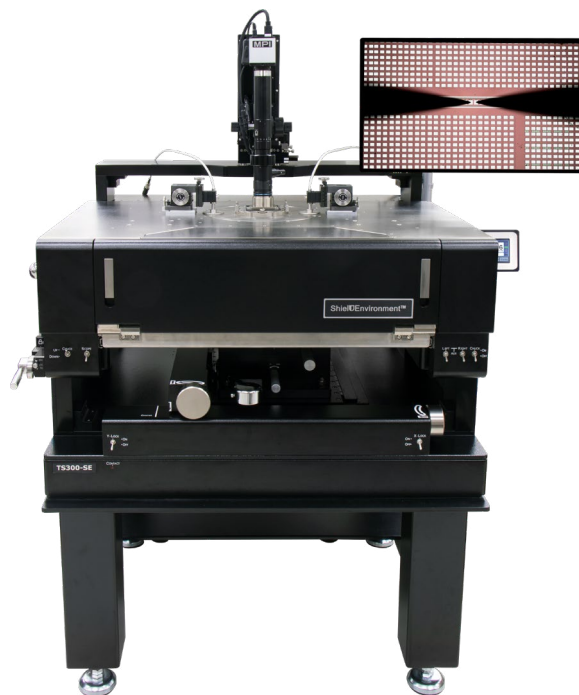
- Designed for wide variety of applications such as Device Characterization and Modeling, RF and mmW Wafer Level Reliability, and Failure Analysis

MPI ShieldEnvironment™ for Accurate Measurements

- Design for Advanced EMI / RFI / Light-Tight Shielding
- FemtoAmp low-leakage capabilities
- Integrated active vibration isolation
- Ready for temperature range -60 °C to 300 °C

Ergonomic Design and Options

- Unique puck controlled air bearing stage for quick single-handed operation
- Available with various chuck options and wide range of accessories such as DC/RF/mmW MicroPositioners, microscopes and ShieldEnvironment™ provide excellent support for various application requirements



SPECIFICATIONS

Chuck XY Stage (Standard)

Fast and fine travel range	325 x 325 mm (12.8 x 12.8 in)
Fine-travel resolution	< 1.0 µm (0.04 mils) @ 500 µm/rev
Planarity	< 10 µm
Theta travel (standard)	360°
Theta travel (fine)	± 5.0°
Theta resolution	7.5 x 10 ⁻³ gradient
Movement	Puck controlled air bearing stage
MPI Safe Contact	XY stage is locked, as soon in contact, with LED indication

Chuck Z Stage

Travel range	5 mm (0.2 in)
Fine-travel resolution	< 1.0 µm (0.04 mils) @ 500 µm/rev
Load stroke	20 mm, pneumatically

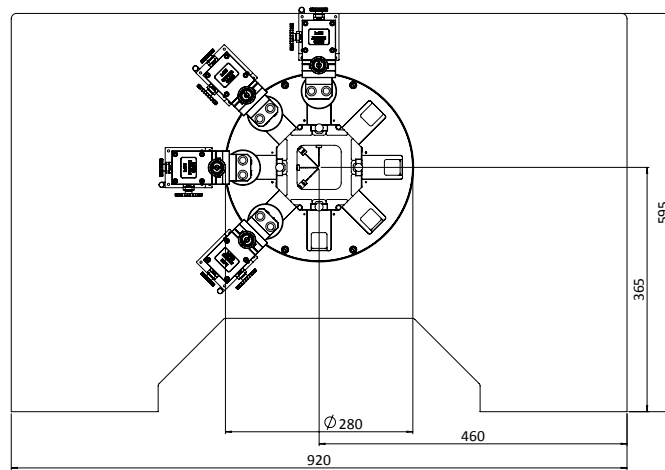
Manual Microscope Stage (Linear)

Movement range	50 x 50 mm (2 x 2 in)
Resolution	< 5 µm (0.2 mils)
Scope lift	140 mm vertical, pneumatic control
Movement	Independently controlled X and Y movement with locking screws

PROBE PLATEN

Specifications

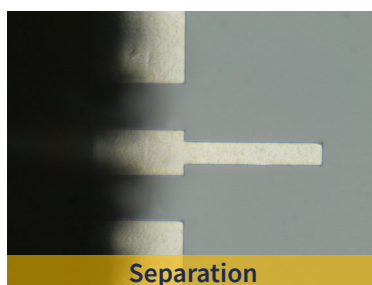
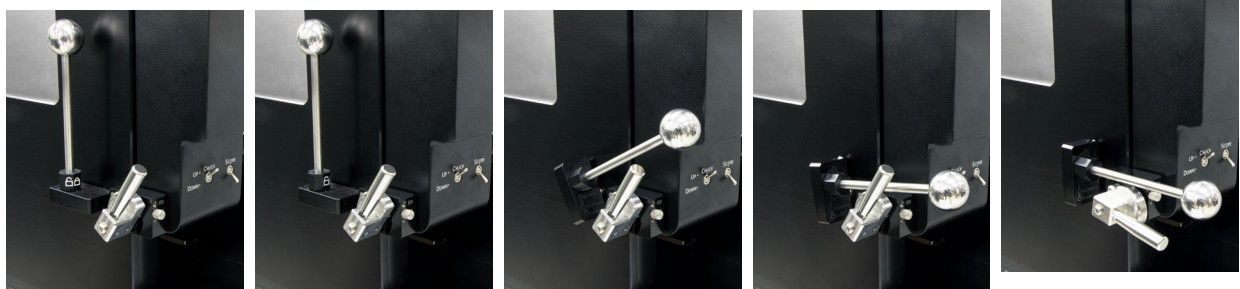
Material	Nickel plated steel
Dimension	See drawing
Chuck to ShieldGuard height	Min. 5 mm
Max. No of MicroPositioners	8x DC MicroPositioners or 4x DC + 4x RF MicroPositioner Setup
Platen lift control	3 positions - contact (0), separation (300 μ m), and loading (3 mm)
MPI Probe Hover Control (PHC™)	Additional hover height (50, 100 or 150 μ m) for easy probe to pad alignment
Contact repeatability	< 1 μ m (0.04 mils) by “automated” control
RF MicroPositioner mounting	Magnetic with guided rail
MicroPositioner mounting	Magnetic
300 °C thermal isolation	Depending on chuck configuration



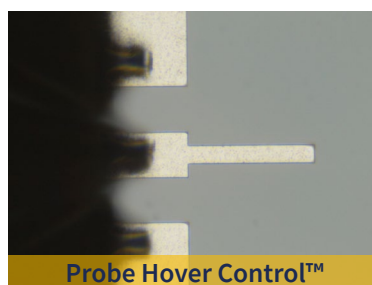
Universal probe platen design for up to 8 DC MicroPositioners

Platen Lift with Probe Hover Control™

MPI Probe Hover Control™ comes with hover heights (50, 100 or 150 μ m) for easy and convenient probe to pad alignment.



Separation



Probe Hover Control™



Probe in contact

ShieldEnvironment™

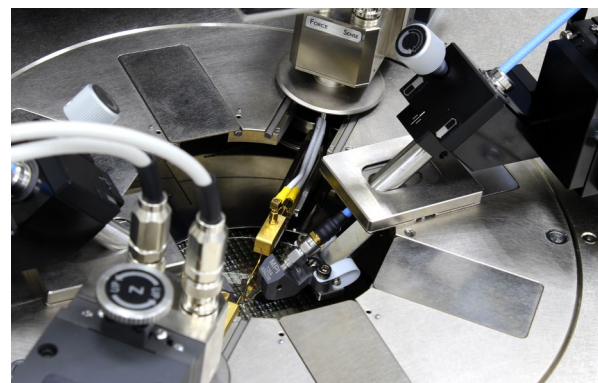
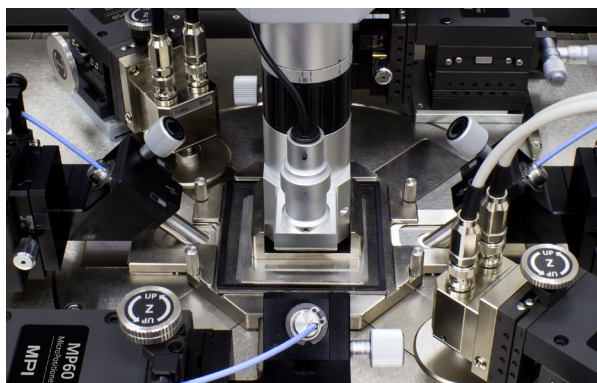
MPI ShieldEnvironment™ is a high performance local environmental chamber providing excellent EMI- and light-tight shielded test environment for ultra-low noise, low capacitance measurements.

MPI ShieldEnvironment™ allows up to 4-port RF or up to 8-ports DC/Kelvin or a combination of those configurations. MPI ShieldCap™ provides easy reconfiguration of measurement setup as well as EMI/noise shielding - which make great difference in simplifying day to day operations.

ShieldEnvironment™ Electrical Specifications*

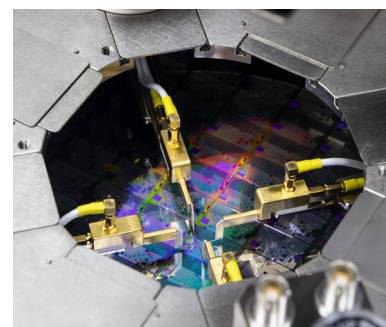
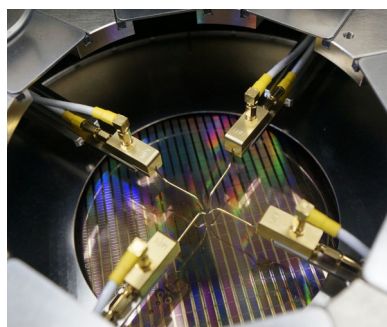
EMI shielding	> 30 dB (typical) @ 1 kHz to 1 MHz
Light attenuation	≥ 130 dB
Spectral noise floor	≤ -180 dBVrms/rHz (≤ 1 MHz)
System AC noise	≤ 5 mVp-p (≤ 1 GHz)

*Including 4 MicroPositioners.



TYPICAL CONFIGURATION WITH MPI KELVIN AND MPI KELVIN-HIGH TEMPERATURE PROBES INSIDE SHIELD ENVIRONMENT™

	Coax Probe	Triax Probe	Kelvin Probe	Kelvin HT Probe
Max voltage	500 V	500 V	500 V	500 V
Temperature range	-60 °C to 300 °C	-60 °C to 300 °C	-60 °C to 200 °C	-60 °C to 200 / 300 °C
Leakage current	< 0.8 pA	< ± 20fA	< ± 10fA	< ± 10fA / < ± 20fA
Connectivity	SMB / BNC	Standard Triax	Kelvin Triax	Kelvin Triax
Connectivity type	Single, Coaxial	Single, low noise Triaxial	Force / Sense, low noise Triaxial	
Characteristics impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Residual capacitance	< 95 fF	< 95 fF	< 95 fF	< 95 fF
Probe holder material	Au-plated Brass		Au-plated Brass (Guarded)	
Probe tip type	Variety of metal tips		Coaxial / Guarded	Guarded ceramic blades
Probe tips material	W, BeCu, Au-plated		W	WRe
Probe tips radius	0.5 μm – 25 μm	0.5 μm – 25 μm	0.5 μm – 5 μm	2 μm – 5 μm
Minimum pad size	25 μm x 25 μm	25 μm x 25 μm	30 μm x 30 μm	25 μm x 25 μm



Typical MPI configuration with Kelvin Probes

NON-THERMAL CHUCKS

Standard Wafer Chuck

Connectivity	Coax BNC (f)
Diameter	310 mm with 2 integrated AUX areas
Material	Nickel plated aluminum (flat with 0.5 mm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum grooves sections (diameter)	4, 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288 mm
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)
Surface planarity	≤ ± 5 μm**
Rigidity	< 15 μm / 10 N @edge

*Single DUT testing requires higher vacuum conditions dependent upon testing application.

**By using SENTIO® topography

Triaxial Wafer Chuck

Connectivity	Kelvin Triax (f)
Diameter	310 mm

Material	Nickel plated aluminum (flat with 0.5 mm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum holes sections (diameter)	4, 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288 mm
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)
Surface planarity	$\leq \pm 5 \mu\text{m}^{**}$
Rigidity	$< 15 \mu\text{m} / 10 \text{ N @edge}$

***By using SENTIO® topography*

Triaxial RF Wafer Chuck

Connectivity	Kelvin Triax (f)
Diameter	310 mm with 2 integrated AUX chucks
Material	Nickel plated aluminum (flat with 0.5 mm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum holes sections (diameter)	4, 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288 mm
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)
Surface planarity	$\leq \pm 5 \mu\text{m}^{**}$
Rigidity	$< 15 \mu\text{m} / 10 \text{ N @edge}$

**Single DUT testing requires higher vacuum conditions dependent upon testing application.*

***By using SENTIO® topography*

Auxiliary Chuck

Quantity	2 AUX chucks
Position	Integrated to front side of main chuck
Substrate size (W x L)	Max. 25 x 25 mm (1 x 1 in)
Material	Ceramic, RF absorbing material for accurate calibration
Surface planarity	$\leq \pm 5 \mu\text{m}$
Vacuum control	Controlled independently, separate from chucks

Electrical Specification (Coax)

Operation voltage	In accordance with EC 61010, certificates for higher voltages available upon request
Maximum voltage between chuck top and GND	500 V DC
Isolation	$> 2 \text{ G}\Omega$

Electrical Specification (Triax)

Chuck Isolation	At 10 V
Force-to-Guard	$> 5 \text{ T Ohm}$
Guard-to-Shield	$> 1 \text{ T Ohm}$
Force-to-Shield	$> 5 \text{ T Ohm}$

THERMAL CHUCKS

Specifications of MPI ERS AirCool® PRIME Technology

	Ambient to 200/300 °C	20 °C to 200/300 °C	Ambient to 200/300 °C	20 °C to 200/300 °C
Chuck type	RF	RF	Ultra low noise	Ultra low noise
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes	Yes
Temperature stability	±0.5 °C	±0.05 °C	±0.05 °C	±0.05 °C
Temperature accuracy	±0.1 °C	±0.1 °C	±0.1 °C	±0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Chuck pinhole surface plating: 200°C / 300°C	Nickel / Gold	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)			
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism	< ±12 μm	< ±12 μm	< ±12 μm	< ±12 μm
Max. Voltage between				
Force-to-GND	600 V DC	600 V DC	600 V DC	600 V DC
Force-to-Guard	100 V DC	100 V DC	600 V DC	600 V DC
Heating rates	35 to 200 °C < 15 min 35 to 300 °C < 25 min	20 to 200 °C < 18 min 20 to 300 °C < 28 min	35 to 200 °C < 18 min 35 to 300 °C < 28 min	20 to 200 °C < 20 min 20 to 300 °C < 30 min
Cooling rates*	200 to 35 °C < 28 min 300 to 35 °C < 35 min	200 to 20 °C < 30 min 300 to 20 °C < 38 min	200 to 35 °C < 30 min 300 to 35 °C < 38 min	200 to 20 °C < 33 min 300 to 20 °C < 40 min
Leakage @ 10 V	N/A	N/A	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C
Electrical isolation	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	N/A	N/A
Capacitance				
Force-to-Guard	< 1600 pF	< 1600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF	< 2000 pF

* All data are relevant for chucks in ECO mode.

Specifications of MPI ERS AirCool® PRIME Technology

	-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type	RF	RF	RF
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Interfaces	RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200°C / 300°C	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)		
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C
Surface flatness and base parallelism	< ±12 μm	< ±12 μm	< ±12 μm
Max. Voltage between			
Force-to-GND	600 V DC	600 V DC	600 V DC
Force-to-Guard	100 V DC	100 V DC	100 V DC
Heating rates			
25 °C	-10 to 25 °C < 8 min	-40 to 25 °C < 10 min	-60 to 25 °C < 12 min
200 °C		25 to 200 °C < 18 min	
300 °C		25 to 300 °C < 30 min	
Cooling rates*			
300 °C	300 to 25 °C < 35 min	300 to 25 °C < 32 min	
200 °C	200 to 25 °C < 28 min	200 to 25 °C < 22 min	
25 °C	25 to -10 °C < 28 min	25 to -40 °C < 55 min	25 to -60 °C < 40 min
Leakage @ 10 V	N/A	N/A	N/A
Electrical isolation		> 5 T Ω at 25 °C or below > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	
Capacitance			
Force-to-Guard	< 1600 pF	< 1600 pF	< 1600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF

* All data are relevant for chucks in ECO mode.

Specifications of MPI ERS AirCool® PRIME Technology

	-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type	Ultra low noise	Ultra low noise	Ultra low noise
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Interfaces	RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200°C / 300°C	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 4x4 mm (4 holes) and 75 mm (3 in) In center for 150, 200, 300 mm (6, 8, 12 in)		
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1.0 °C at > 200 °C
Surface flatness and base parallelism	< ±12 μm	< ±12 μm	< ±12 μm
Max. Voltage between			
Force-to-GND	600 V DC	600 V DC	600 V DC
Force-to-Guard	600 V DC	600 V DC	600 V DC
Heating rates			
25 °C	-10 to 25 °C < 10 min	-40 to 25 °C < 12 min	-60 to 25 °C < 15 min
200 °C		25 to 200 °C < 20 min	
300 °C		25 to 300 °C < 35 min	
Cooling rates*			
300 °C	300 to 25 °C < 38 min	300 to 25 °C < 35 min	
200 °C	200 to 25 °C < 30 min	200 to 25 °C < 25 min	
25 °C	25 to -10 °C < 30 min	25 to -40 °C < 65 min	25 to -60 °C < 45 min
Leakage @ 10 V			
-10, -40 or -60 °C	< 30 fA	< 30 fA	< 30 fA
25 °C	< 15 fA	< 15 fA	< 15 fA
200 °C	< 30 fA	< 30 fA	< 30 fA
300 °C	< 50 fA	< 50 fA	< 50 fA
Capacitance			
Force-to-Guard	< 600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF

* All data are relevant for chucks in ECO mode.

THERMAL CHUCKS DIMENSIONS

System Controller / Chiller Dimensions and Power / Air Consumption

System type	W x D x H (mm)	Weight (kg)	Power cons. (VA)	max. Air flow* (l/min)	CDA dew Point
Ambient	300 x 360 x 135	12	1200	400	≤ 0 °C
20°C, -10 °C to 200 / 300 °C	300 x 360 x 135	12	1200	400	≤ -30 °C
-40 to 200 / 300 °C	420 x 300 x 520	45	1200	400	≤ -40 °C
-60 to 200 / 300 °C	420 x 500 x 1020	140	2400	450	≤ -40 °C
Electrical primary connection		100 to 240 VAC auto switch			
Electrical frequency		50 Hz / 60 Hz			
Compressed air supply		6.0 bar (0.8 MPa, 87 psi)			



ERS AirCool® (patented) Controller
Integrated Chiller -60°C

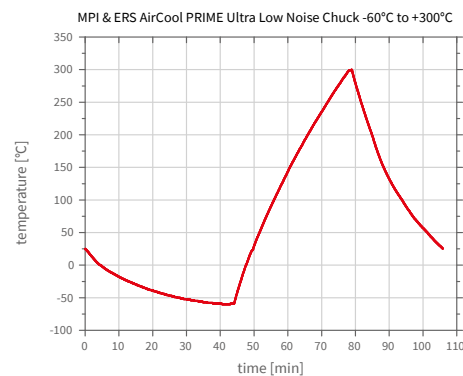
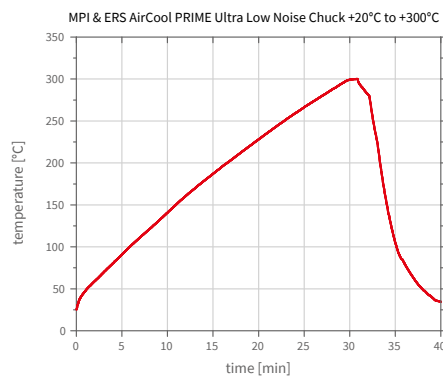
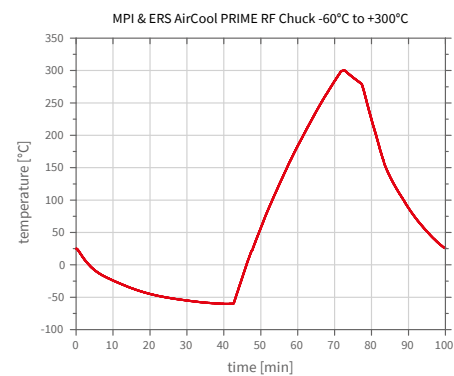
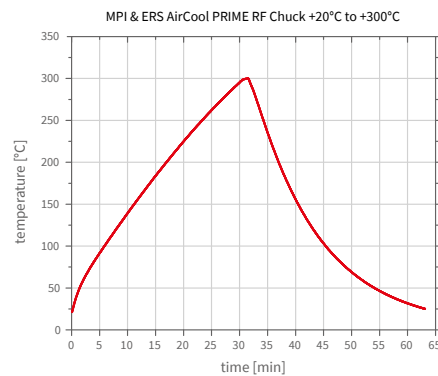


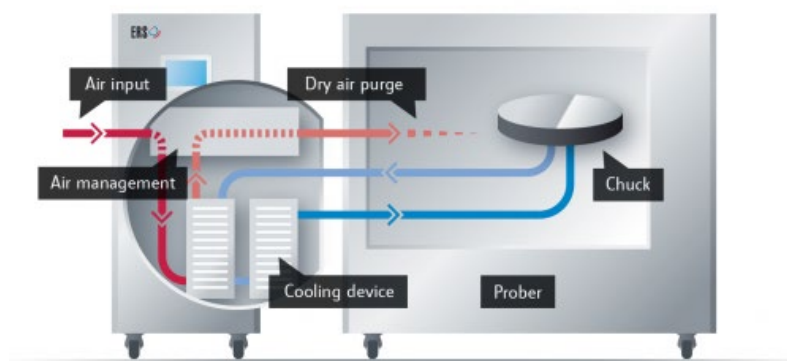
ERS AirCool® (patented) Controller
Integrated Chiller -40°C



ERS and MPI's joint product AirCool® PRIME Chuck won "Electronics Industry Awards 2018" in the category, "Test, Measurement and Inspection Product of the year".

TYPICAL TRANSITION TIME





These chucks incorporate the ERS patented AC3 cooling technology and its air management system to purge the MPI ShieldEnvironment™ directly from “already used” air – reducing dry air consumption up to 30 to 50% as compared to other systems on the market.
Copyright belongs to ERS electronic GmbH

FACILITY REQUIREMENTS

Thermal Chuck Electrical Supply

Electrical Supply Hot only thermal chucks

Electrical primary connection 100 to 240 VAC auto switch

Frequency 50 Hz / 60 Hz

Compressed Air Supply

Operating pressure 6.0 bar (0.6 MPa, 87 psi) at specified flow rate

CDA dew point $\leq 0\text{ }^{\circ}\text{C}$ for hot chuck system (ambient to $300\text{ }^{\circ}\text{C}$)
 $\leq -45\text{ }^{\circ}\text{C}$ for hot and cold chuck system ($-60\text{ }^{\circ}\text{C}$ to $300\text{ }^{\circ}\text{C}$)

General Probe System

Power 100-240 V AC 50/60 Hz for optical accessories* only

Vacuum -0.5 bar (for single DUT) / -0.3 bar (for wafers)

Compressed air 6.0 bar

*e.g. microscope illumination, CCD cameras, monitors.

WARRANTY

- Warranty*: 12 months
- Extended service contract: contact MPI Corporation for more information

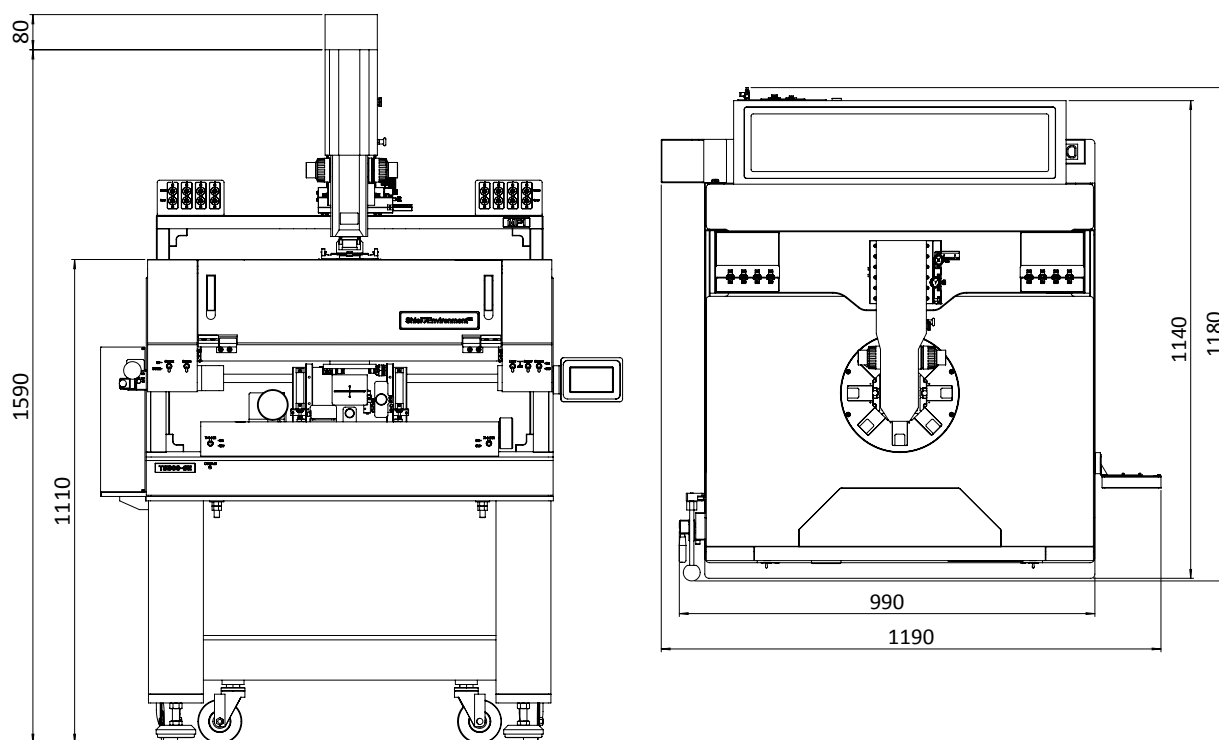
*See MPI Corporation's Terms and Conditions of Sale for more details.

PHYSICAL DIMENSIONS

Station Platform with Bridge*

Dimensions (W x D x H)	1190 x 1180 x 1590 mm (46.9 x 46.5 x 62.6 in)
Weight	~465 kg (1025.1 lb.)

*Station accessories, such as different microscopes, cameras, or laser cutters, may change the total height.



*Can vary depends on monitor/chiller position.

MPI Global Presence



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